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Assessing contributions of natural surface and anthropogenic emissions to atmospheric mercury in a fast-developing region of eastern China from 2015 to 2018

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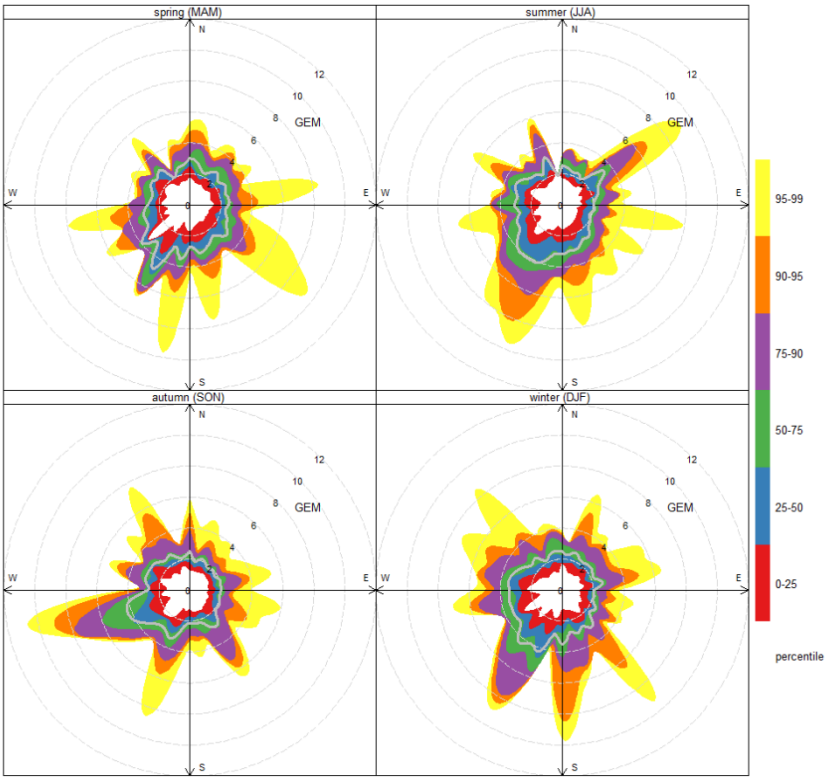

Figure S1. Bivariate polar plots (BPPs) of the percentiles of GEM concentration (a) spring, (b) summer, (c) autumn, (d) winter.

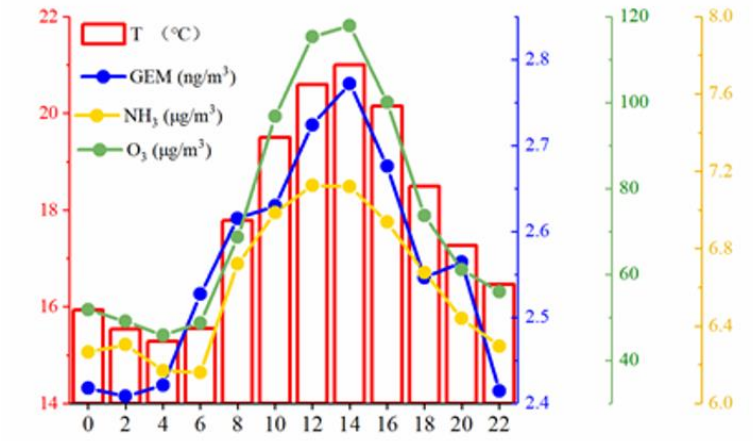

Figure S2. Mean diurnal variations of GEM, NH_3, O_3, and temperature.

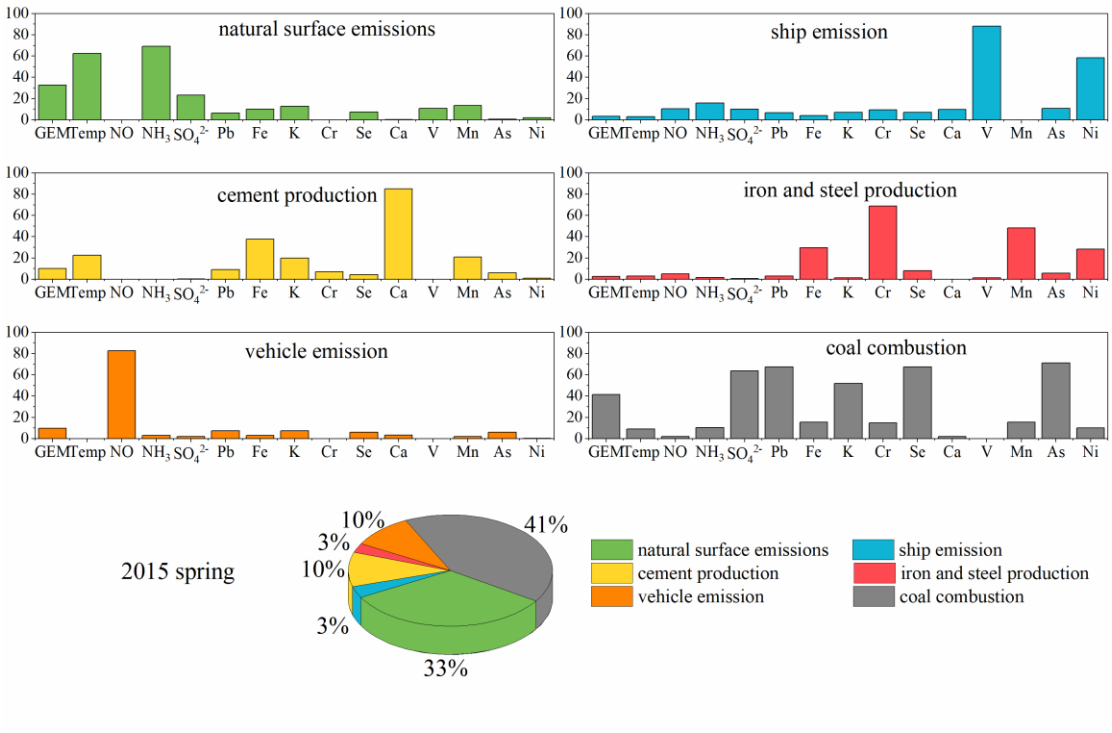

Figure S3. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2015 spring based on PMF analysis.

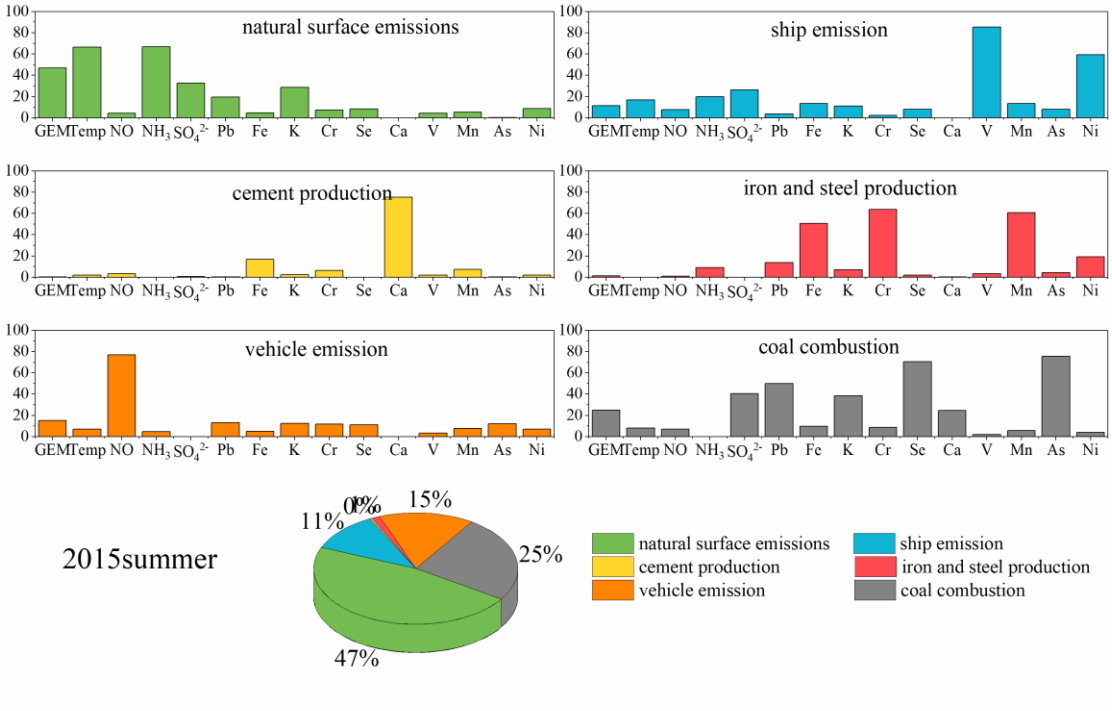

Figure S4. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2015 summer based on PMF analysis.

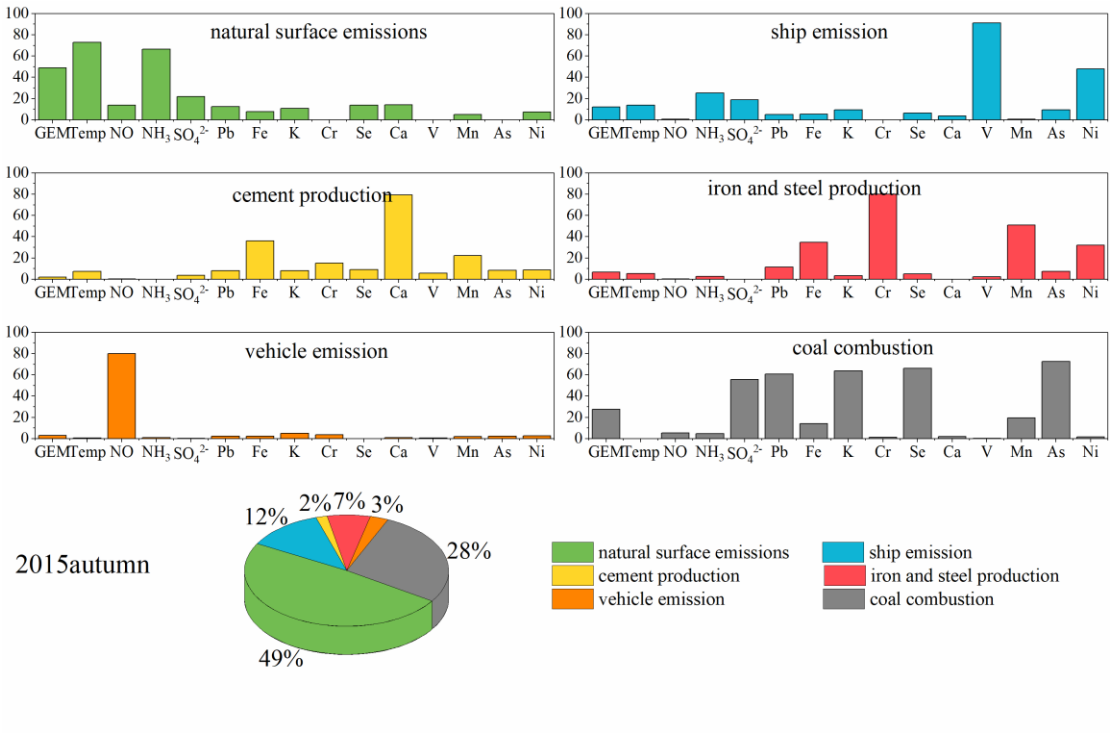

Figure S5. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2015 autumn based on PMF analysis.

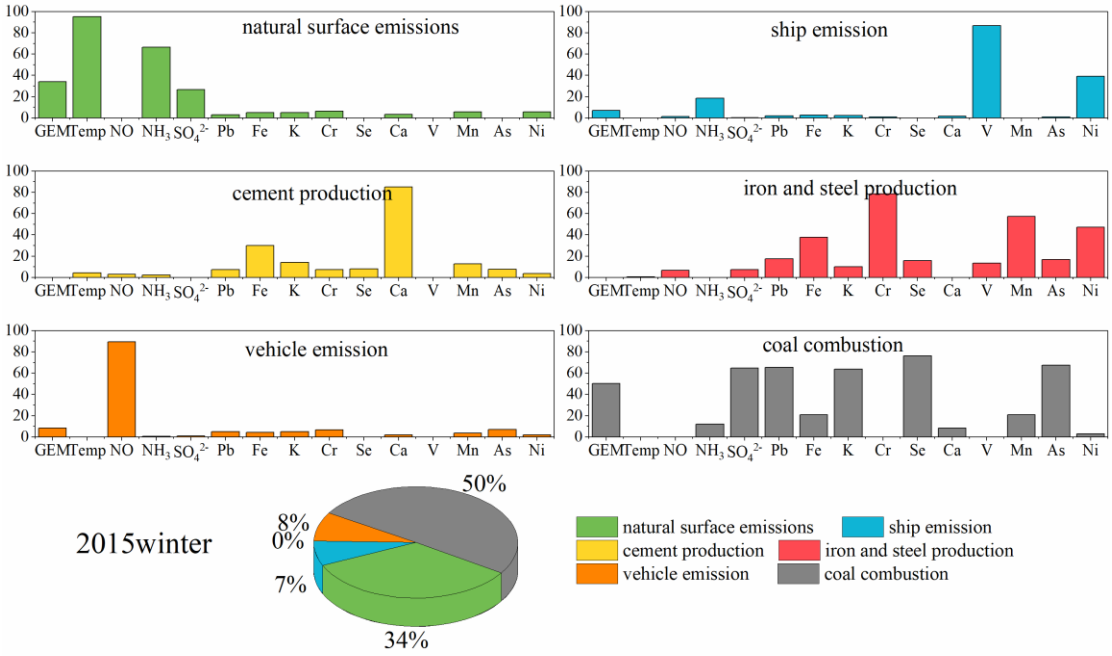

Figure S6. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2015 winter based on PMF analysis.

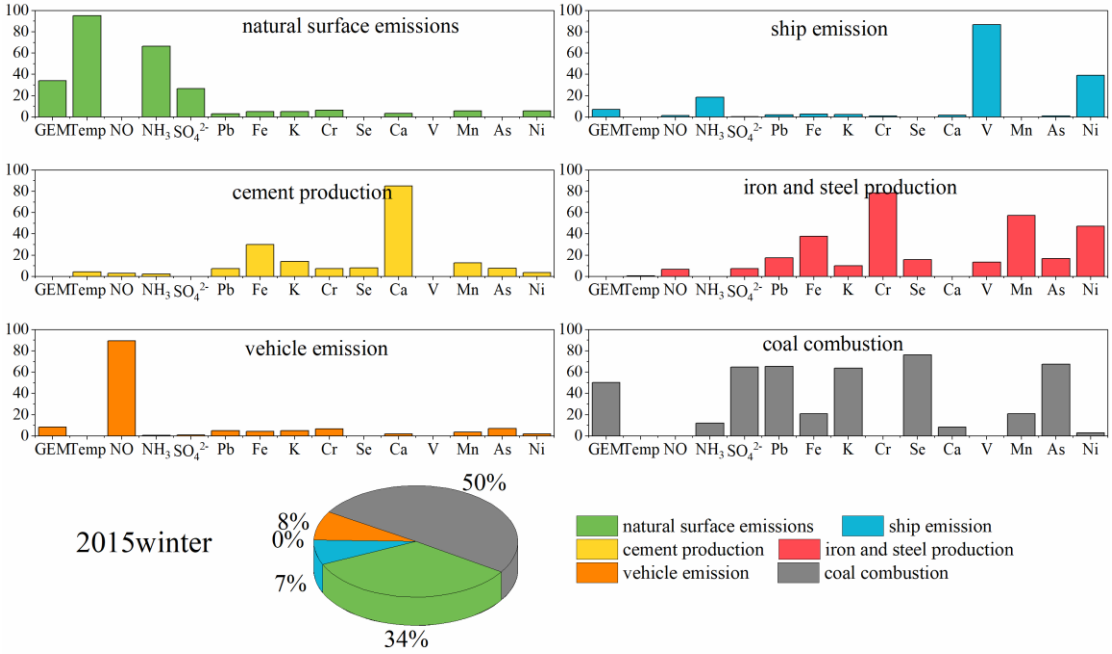

Figure S7. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2016 spring based on PMF analysis.

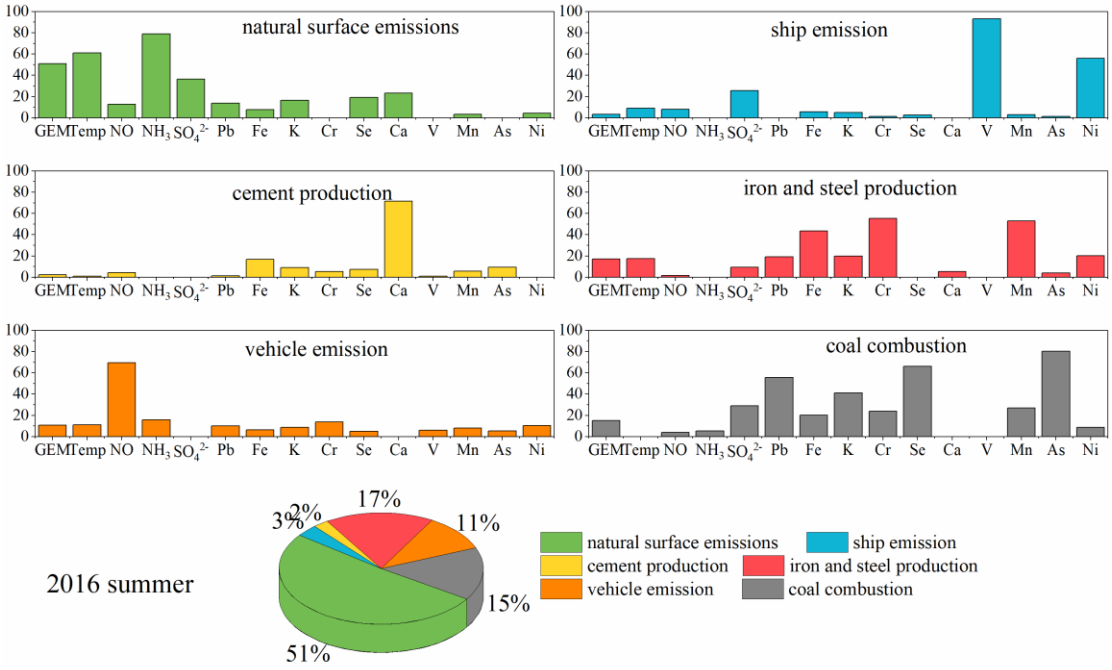

Figure S8. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2016 summer based on PMF analysis.

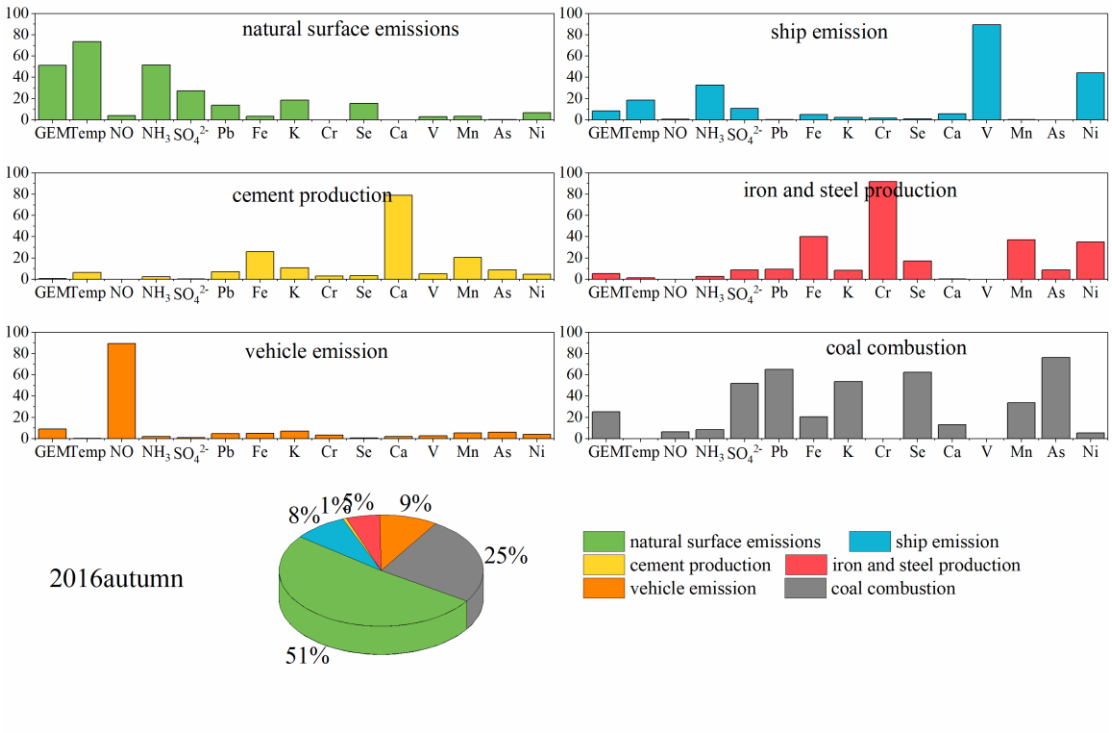

Figure S9. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2016 autumn based on PMF analysis.

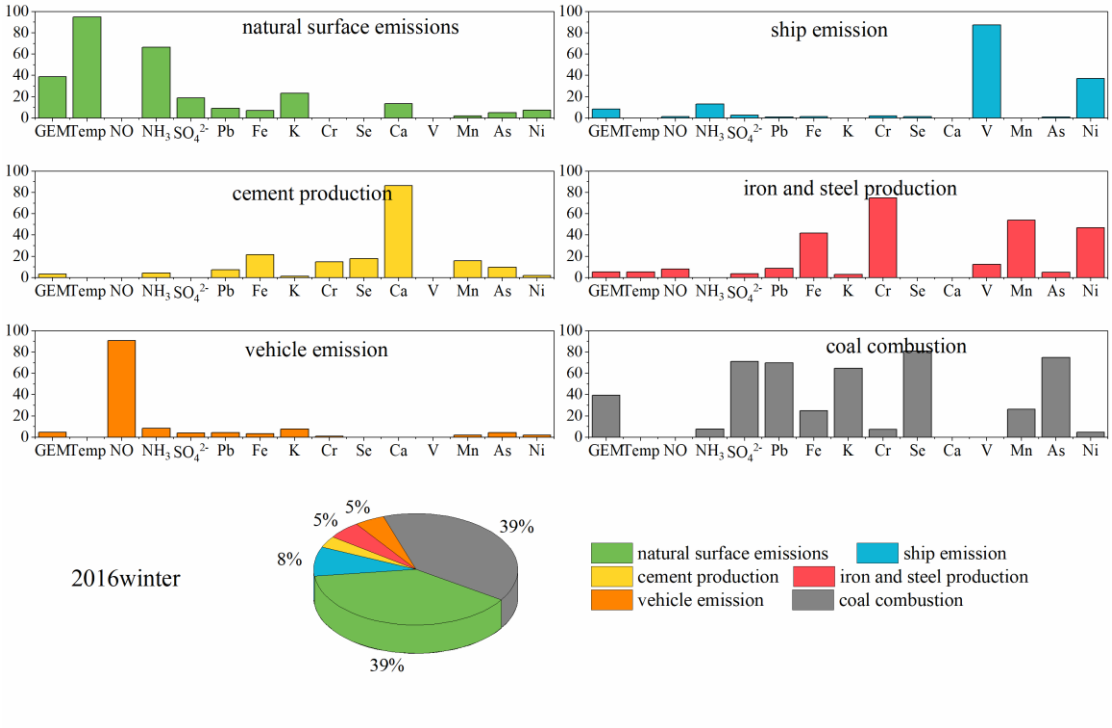

Figure S10. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2016 winter based on PMF analysis.

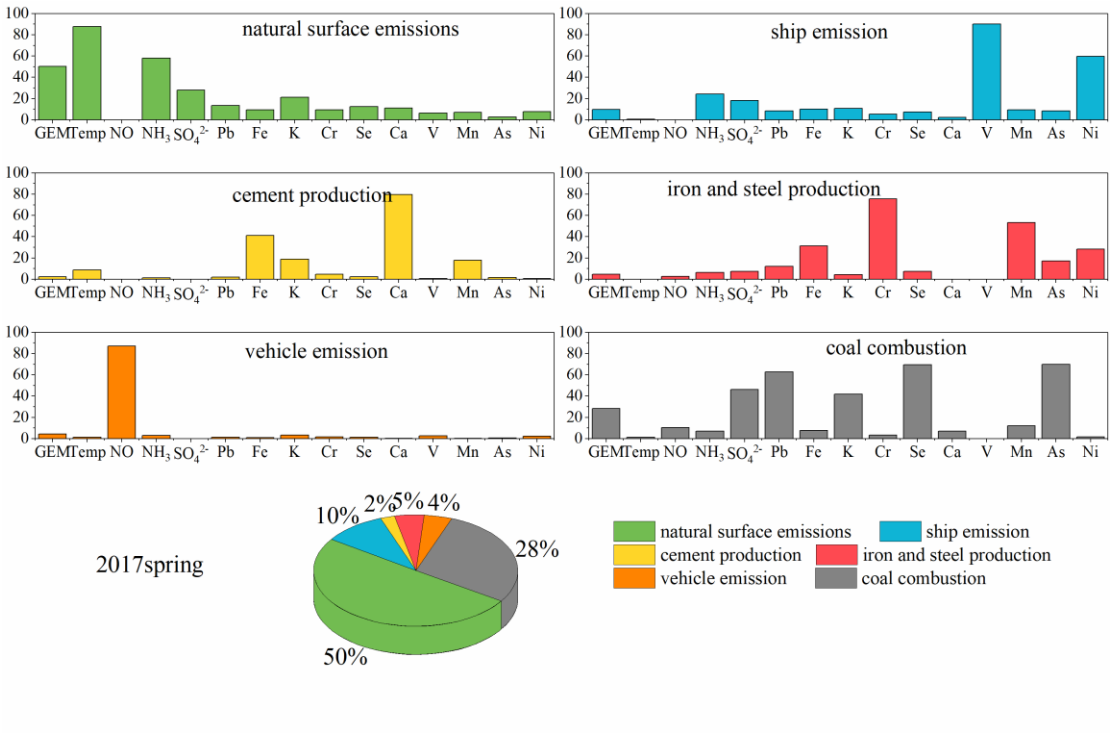

Figure S11. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2017 spring based on PMF analysis.

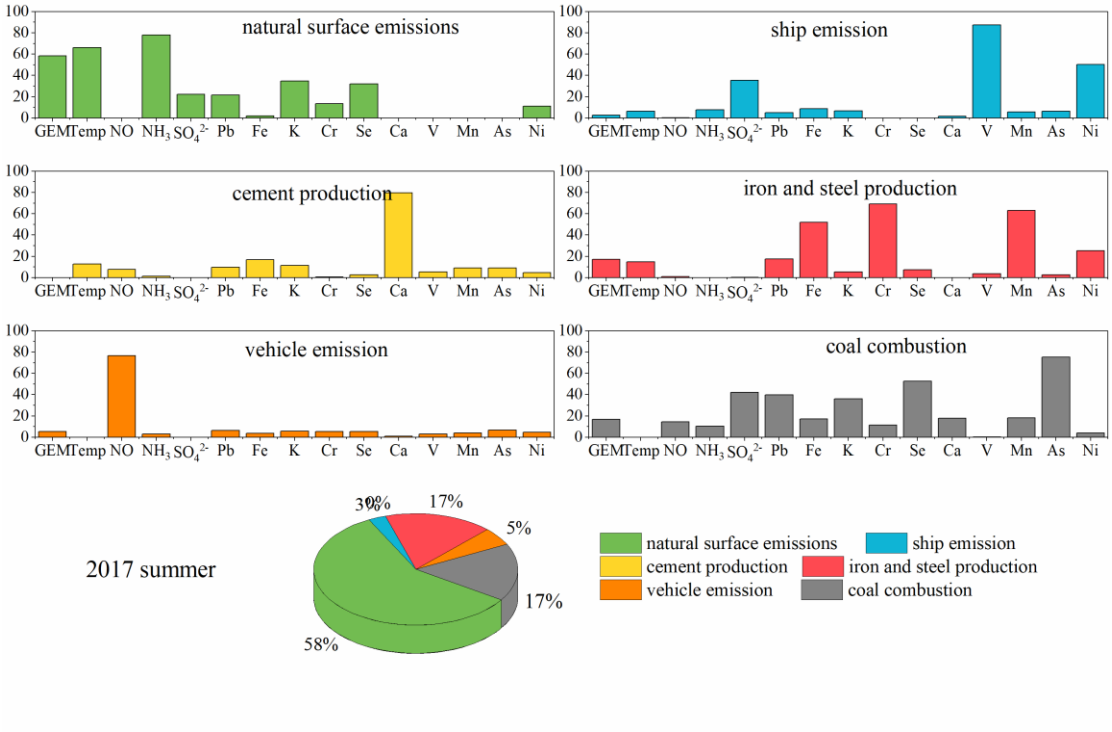

Figure S12. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2017 summer based on PMF analysis.

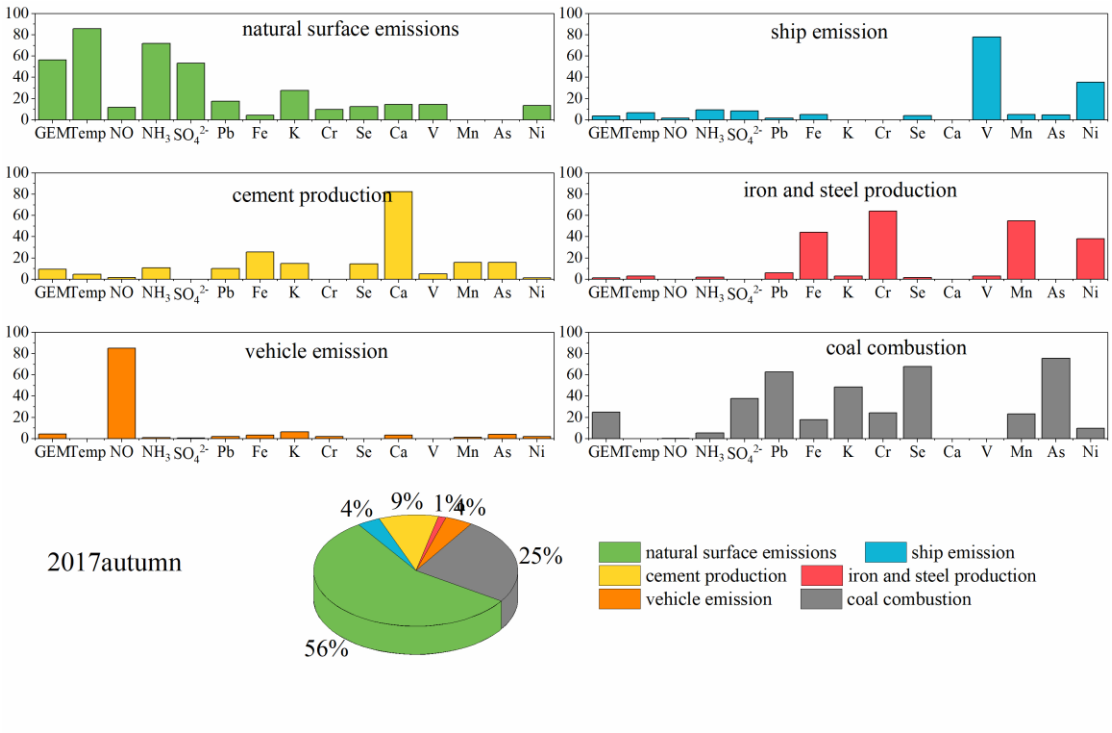

Figure S13. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2017 autumn based on PMF analysis.

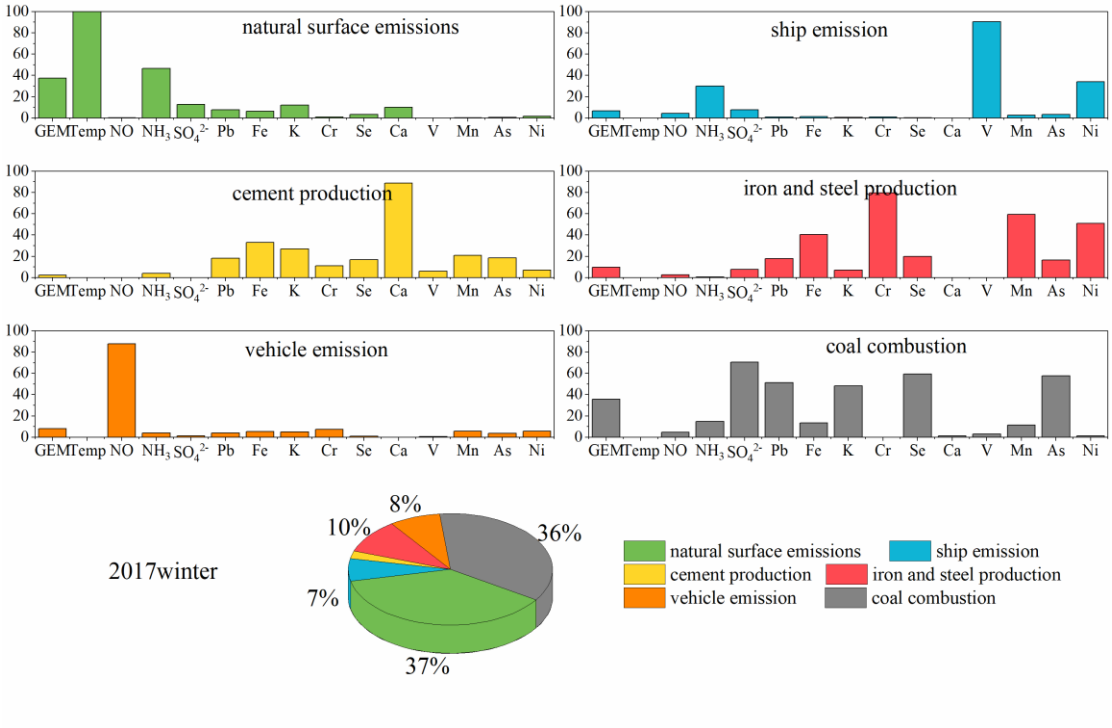

Figure S14. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2017 winter based on PMF analysis.

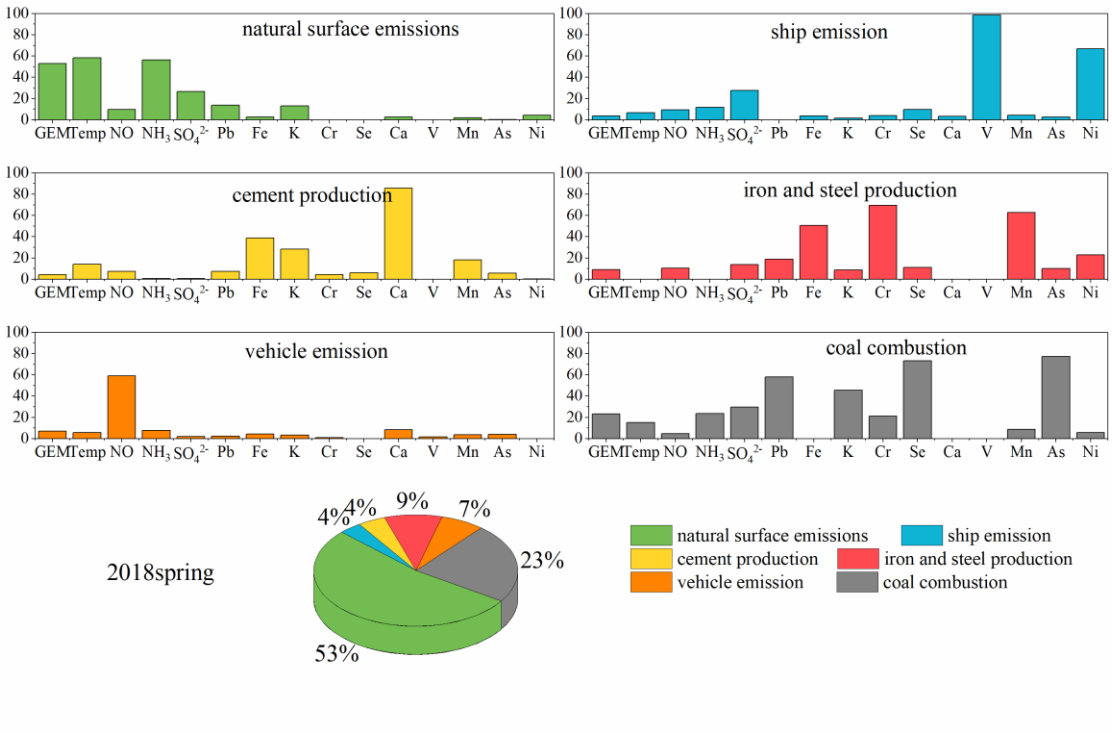

Figure S15. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2018 spring based on PMF analysis.

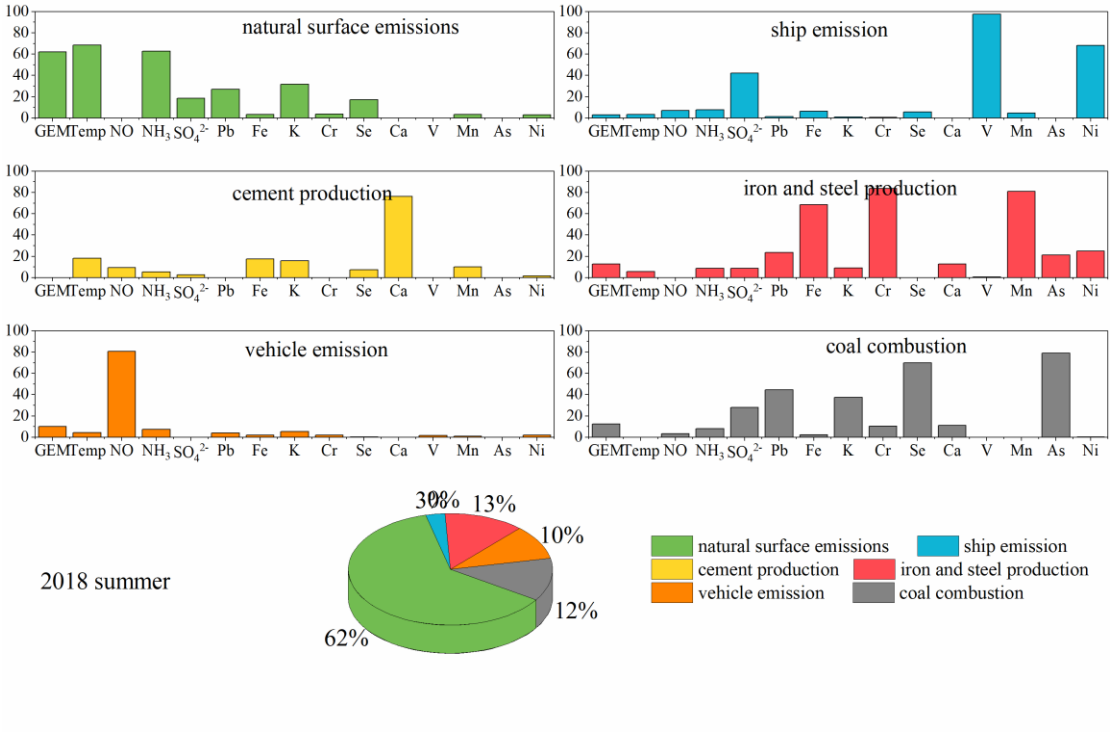

Figure S16. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2018 summer based on PMF analysis.

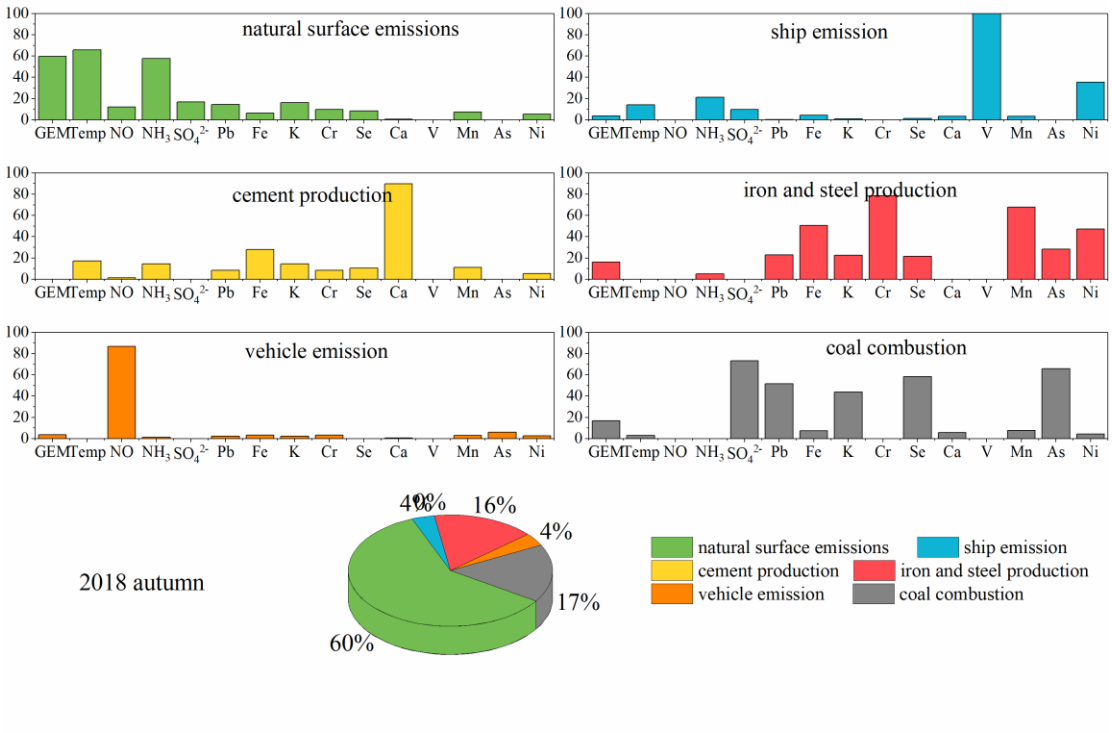

Figure S17. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2018 autumn based on PMF analysis.

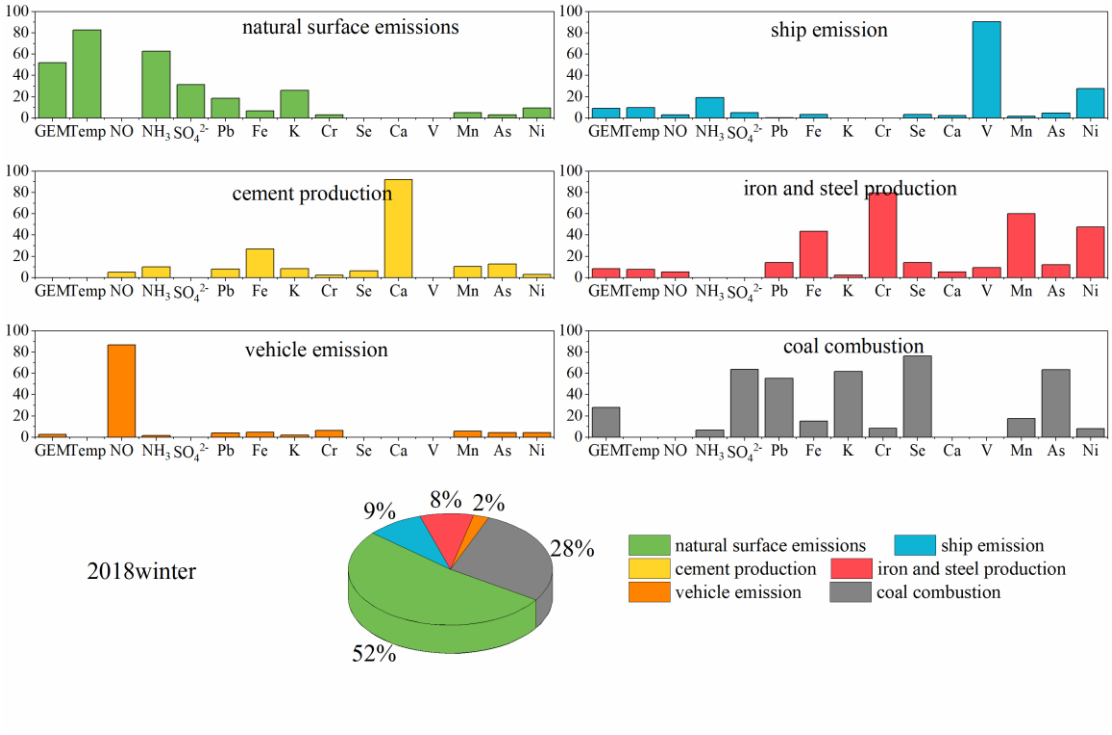

Figure S18. A six-factor source apportionment for natural surface emissions and anthropogenic GEM in 2018 winter based on PMF analysis.

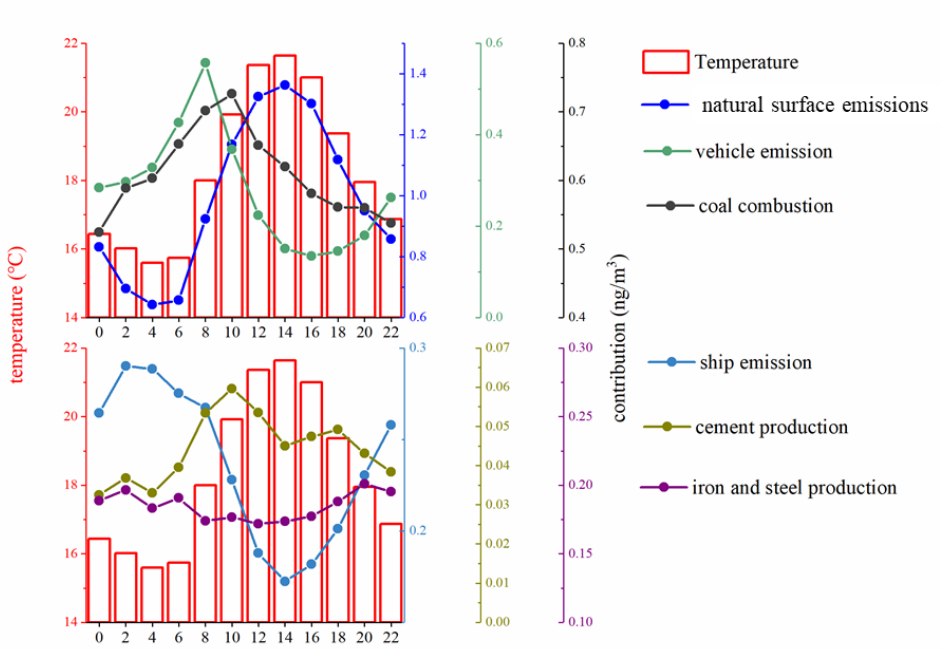

Figure S19. Diurnal variation of absolute GEM concentration contributed by six factors and temperature.

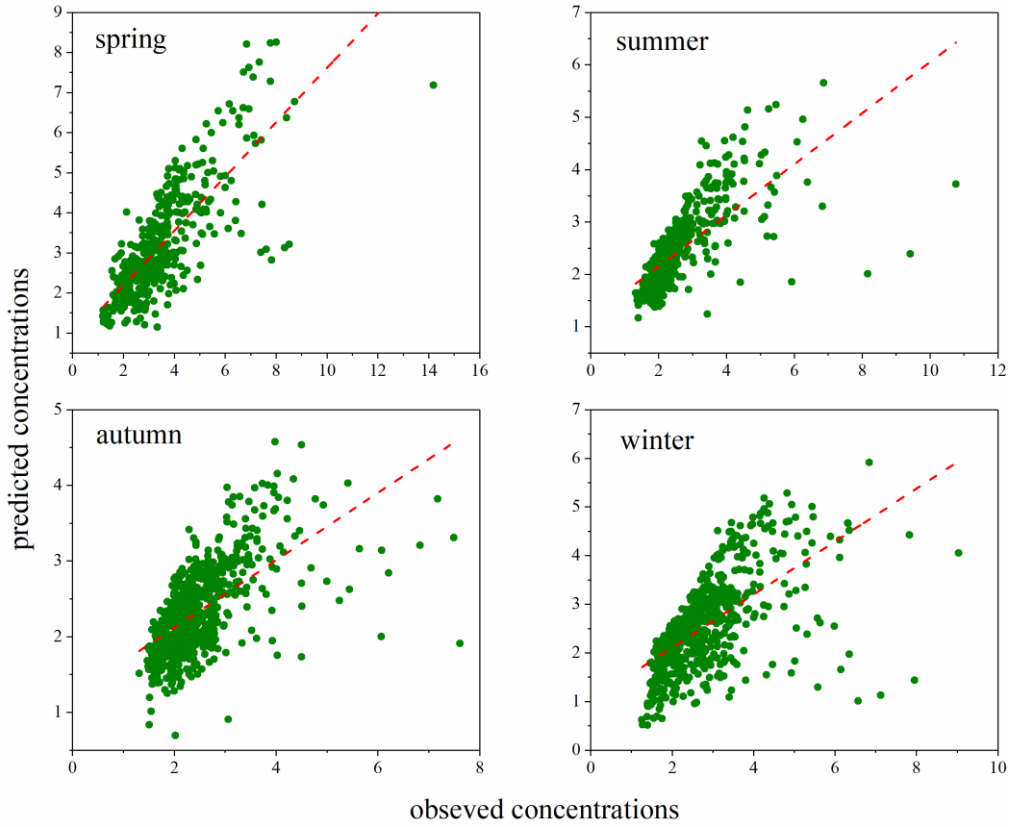

Figure S20. Observation-prediction scatter plot of GEM in 2015.

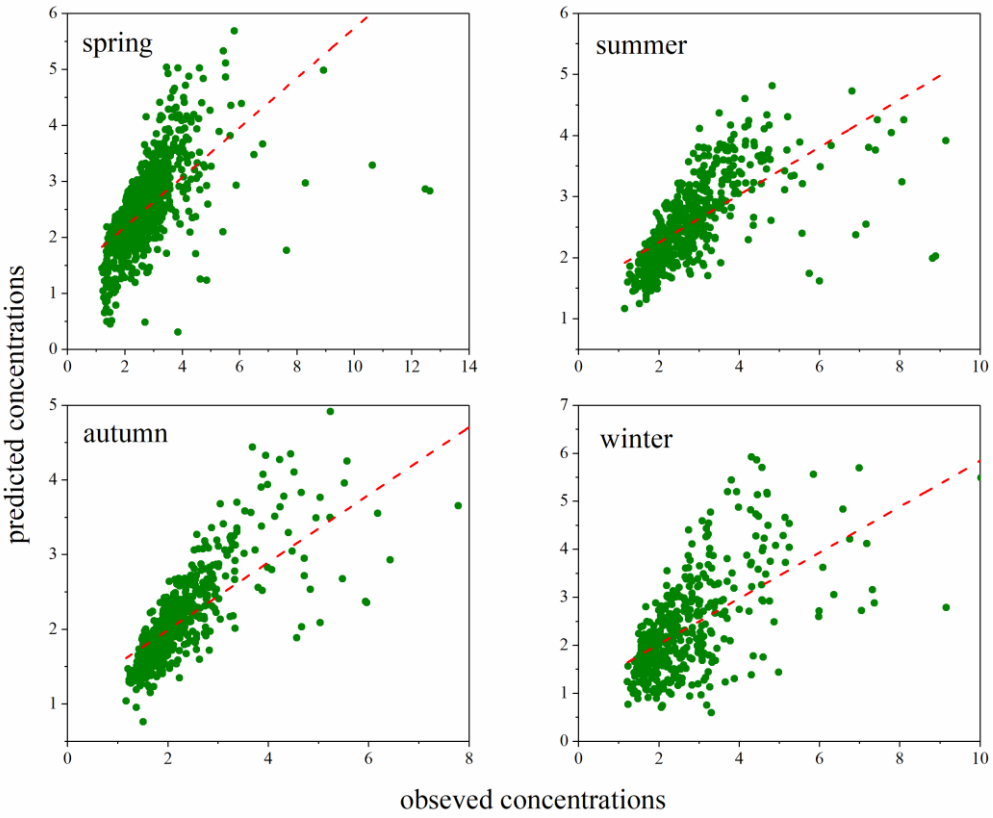

Figure S21. Observation-prediction scatter plot of GEM in 2016.

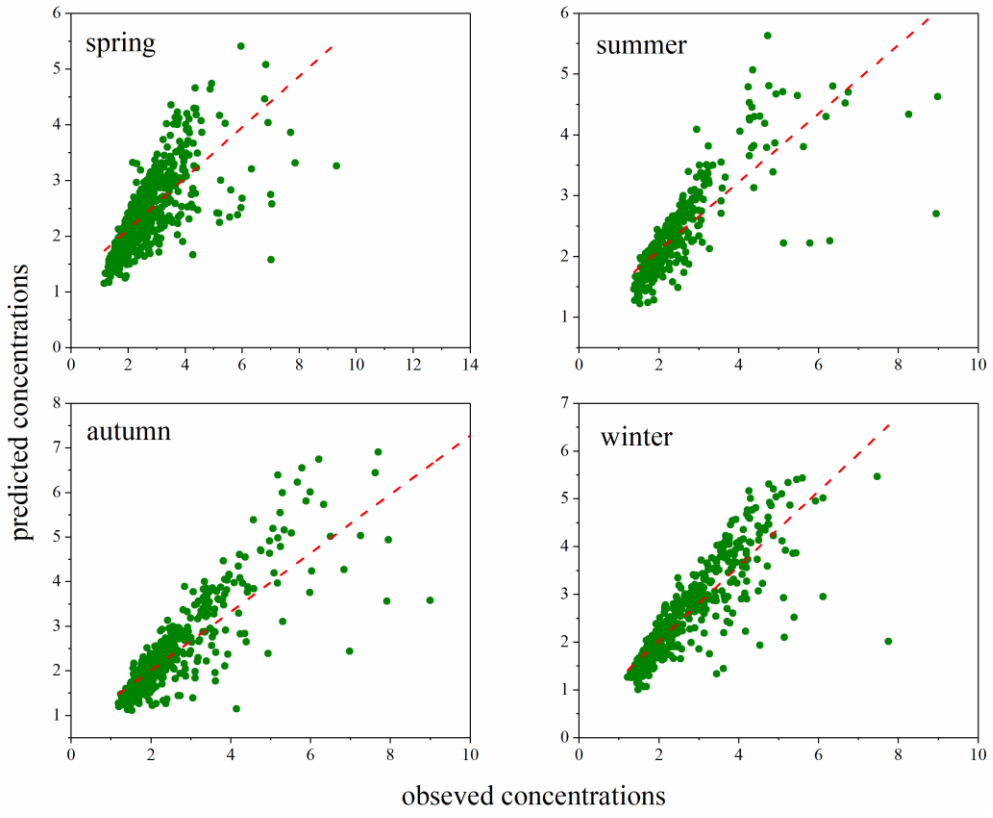

Figure S22. Observation-prediction scatter plot of GEM in 2017.

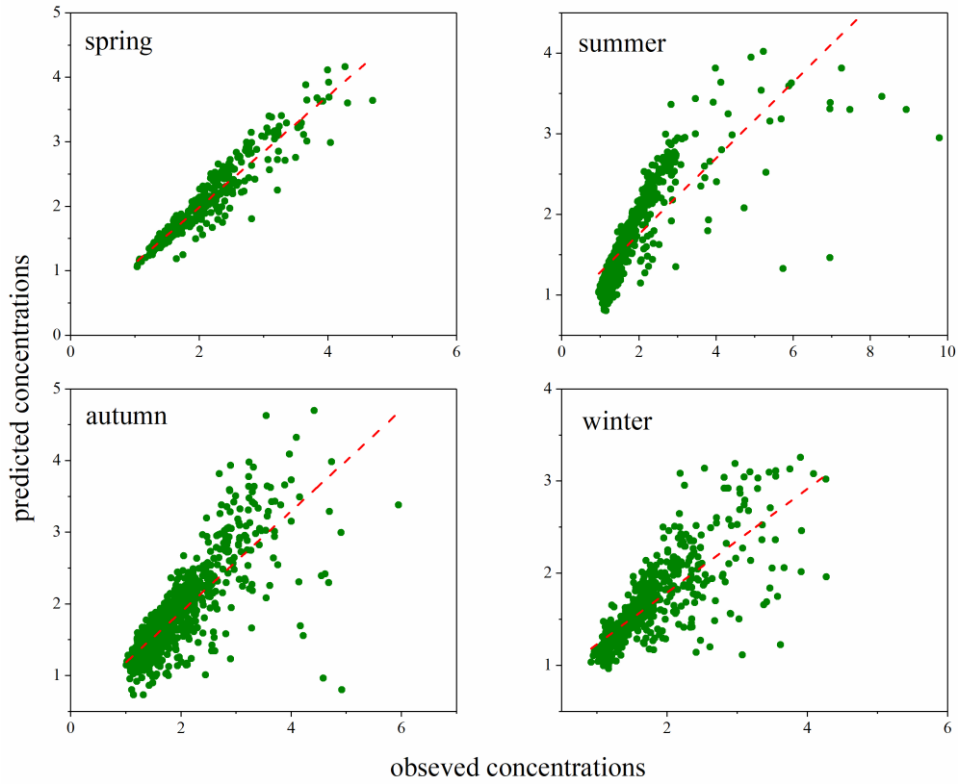

Figure S23. Observation-prediction scatter plot of GEM in 2018.

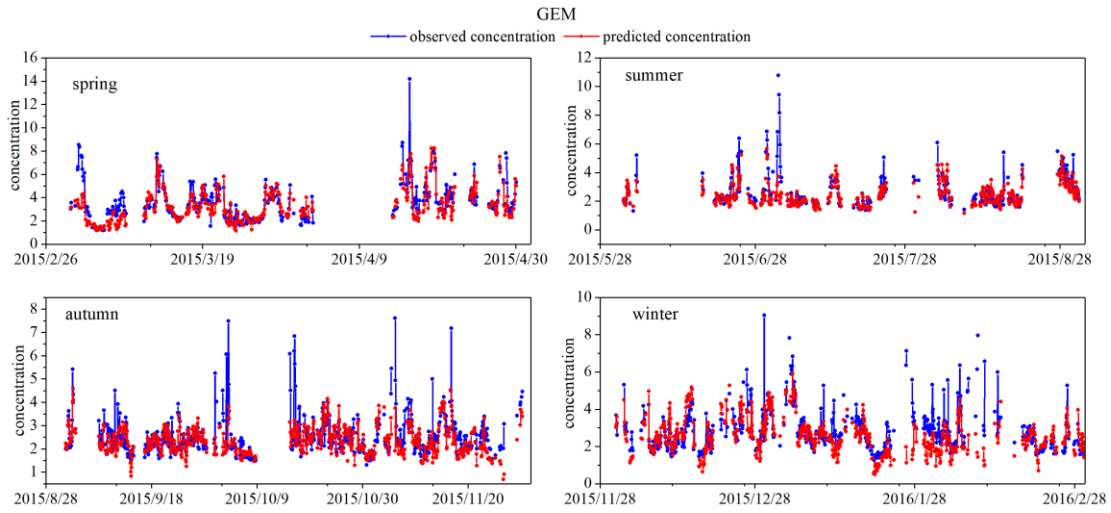

Figure S24. Observation-prediction time series of GEM in 2015.

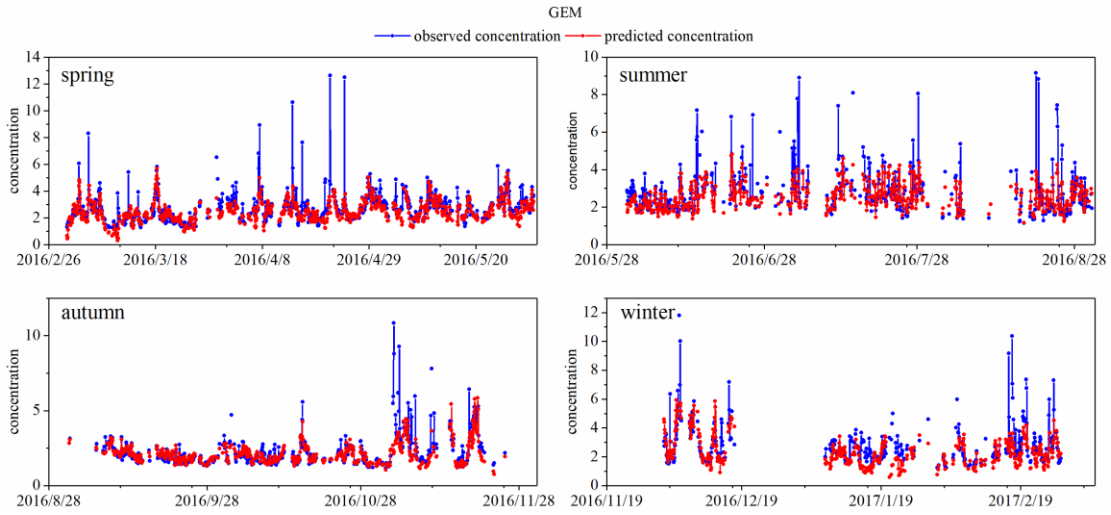

Figure S25. Observation-prediction time series of GEM in 2016.

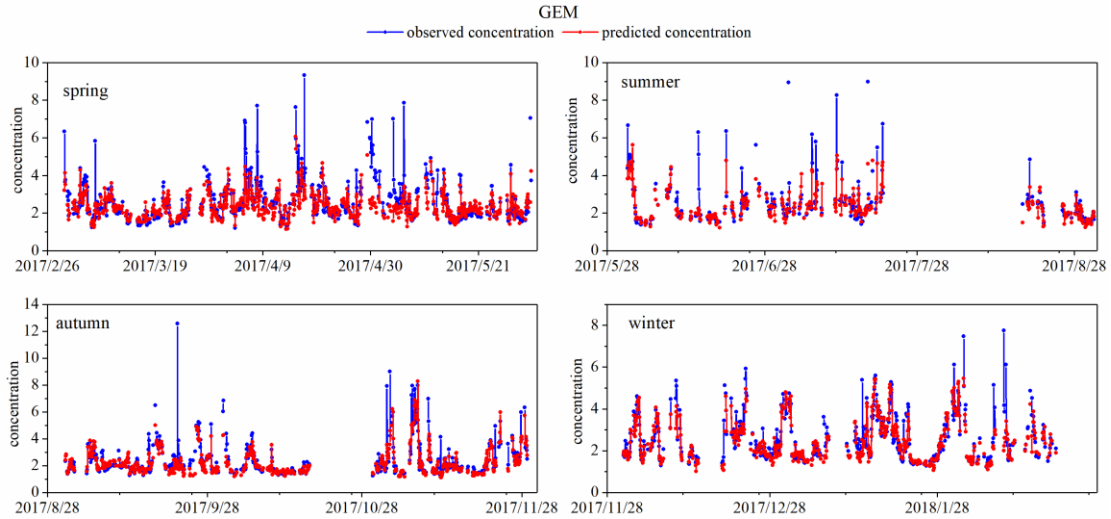

Figure S26. Observation-prediction time series of GEM in 2017.

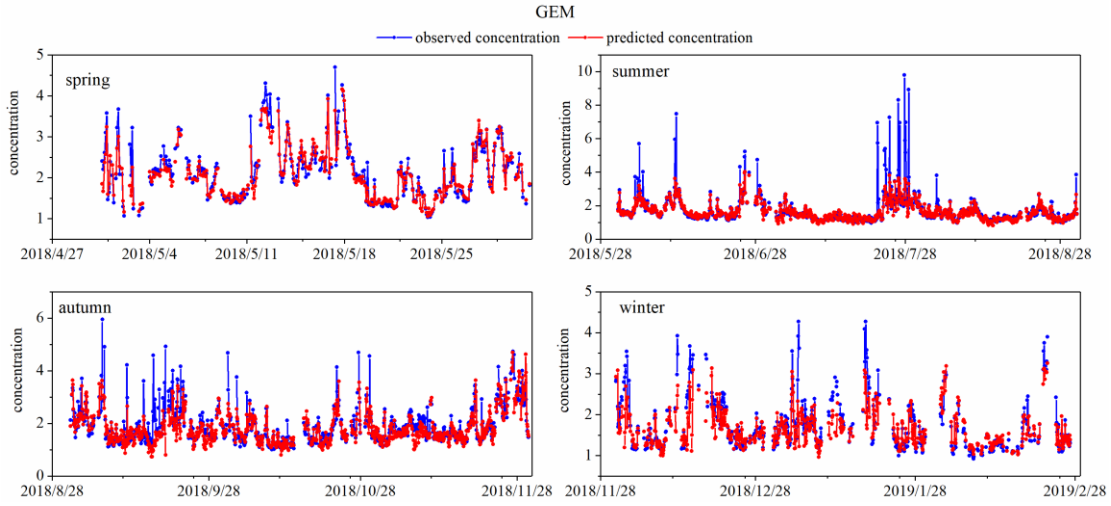

Figure S27. Observation-prediction time series of GEM in 2018.

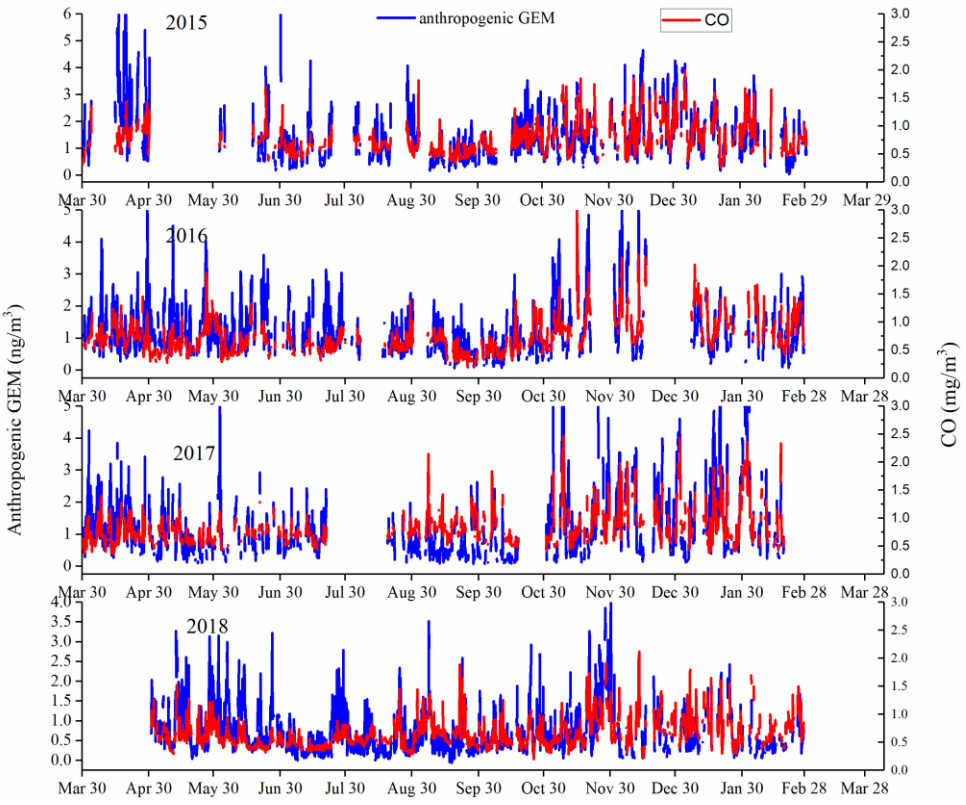

Figure S28. Time series of anthropogenic GEM concentration and CO concentration.

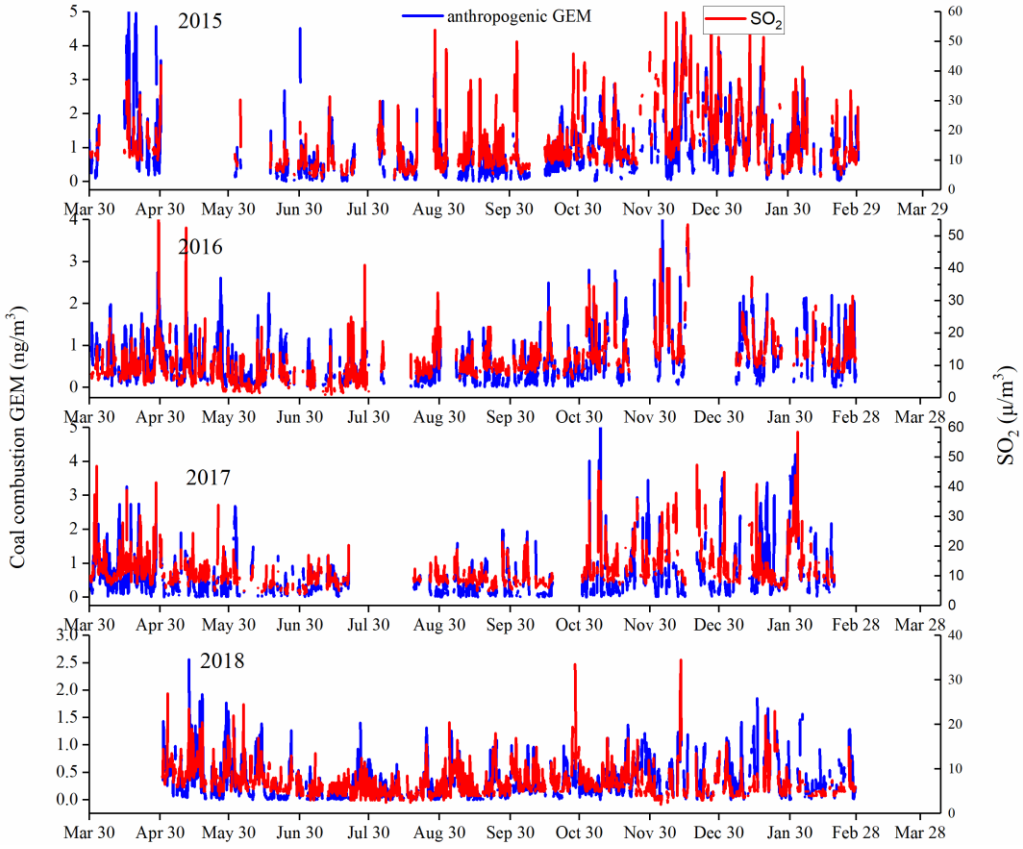

Figure S29. Time series of coal combustion GEM concentration and SO_2 concentration.

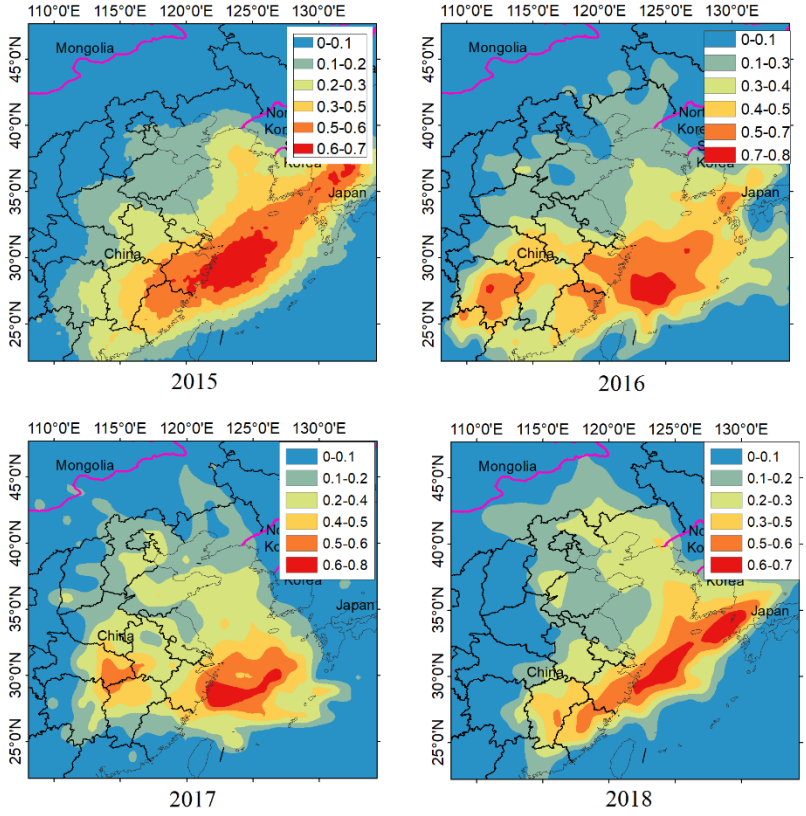

Figure S30. Potential source regions of ship emission GEM from 2015 to 2018

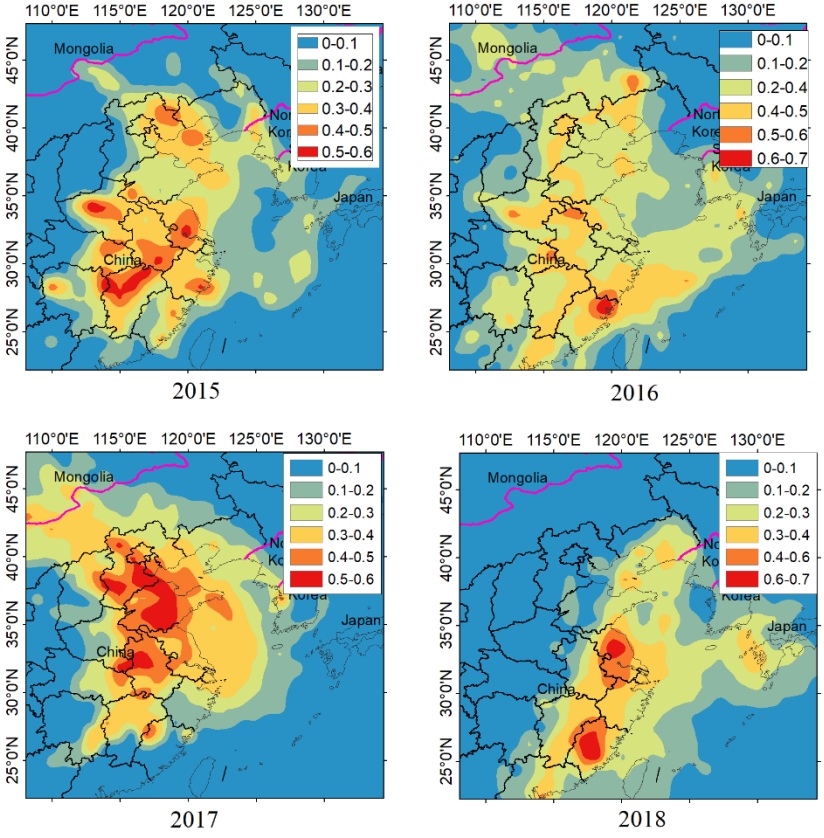

Figure S31. Potential source regions of cement production GEM from 2015 to 2018

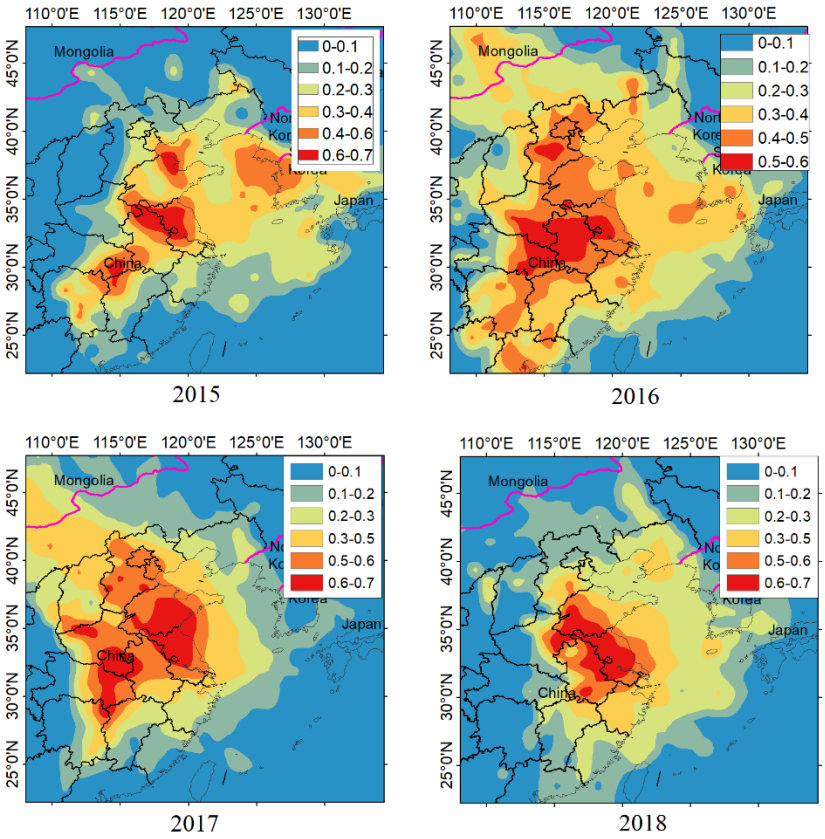

Figure S32. Potential source regions of iron and steel production GEM from 2015 to 2018

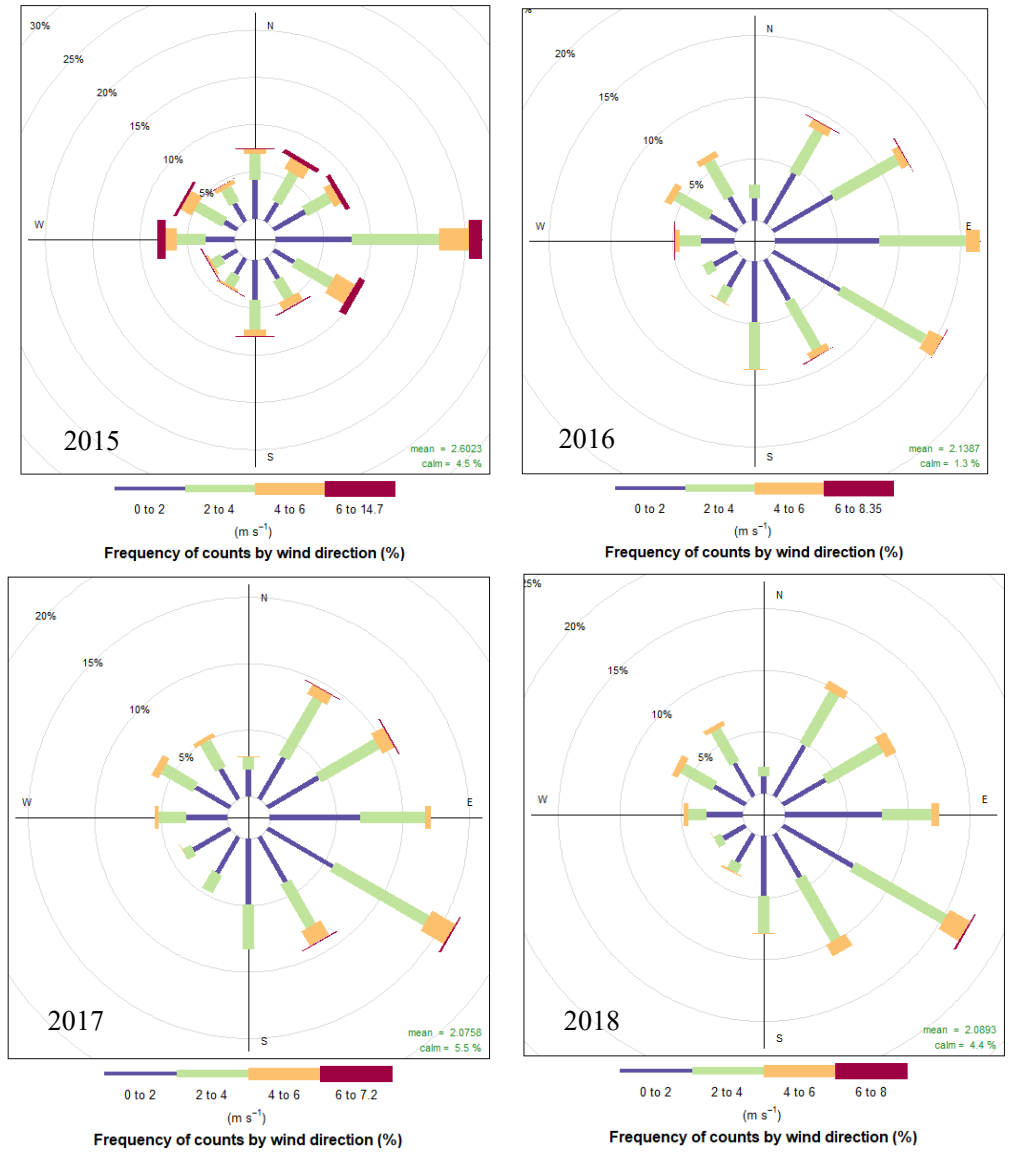

Figure S33. Wind speed and wind direction frequencies from 2015 to 2018.

TableS1. Summary of Fpeak rotation and comparison of the source profiles and contribution between Base Run and Fpeak Run.

year	season	Fpeak strength	dQ (Robust)	%dQ (Robust)	natural surface emission		ship emission		cement production		iron and steel production		vehicle emission		coal combustion	
					Base Run	Fpeak Run	Base Run	Fpeak Run	Base Run	Fpeak Run	Base Run	Fpeak Run	Base Run	Fpeak Run	Base Run	Fpeak Run
2015	spring	0.5	50.4	0.31	32	32	12	11	5	3	1	0	13	13	37	41
	summer	0.5	49.5	0.31	39	39	11	10	0	0	5	5	23	26	22	20
	autumn	0.5	31.9	0.11	41	41	14	14	3	3	7	8	10	9	25	25
	winter	0.5	23.5	0.1	32	32	8	7	0	0	2	0	10	11	49	50
2016	spring	0.5	22.4	0.08	39	39	18	18	1	0	9	10	8	9	26	25
	summer	0.5	48.5	0.24	48	48	9	5	0	0	10	12	20	22	13	13
	autumn	0.5	35.9	0.19	47	50	11	8	0	0	3	3	15	15	24	24
	winter	0.5	40	0.32	33	33	10	10	0	0	13	10	8	9	36	37
2017	spring	0.5	24.4	0.11	45	42	13	12	1	1	12	12	7	8	21	25
	summer	0.5	71	0.76	51	50	4	4	0	0	12	13	23	23	11	10
	autumn	0.5	30.1	0.16	48	47	10	10	3	3	4	4	10	11	24	25
	winter	0.5	39.5	0.19	35	35	8	7	4	3	15	15	7	10	31	30
2018	spring	0.5	58	0.95	52	52	6	8	1	1	8	7	18	15	16	18
	summer	0.5	23.7	0.11	63	62	3	0	0	0	7	8	20	22	7	8
	autumn	0.5	23.6	0.08	53	53	10	10	0	0	14	16	6	7	17	15
	winter	0.5	26.9	0.12	43	43	11	11	0	0	14	14	10	10	22	22

Table S2. PMF model performances on GEM from 2015-2018.

		coefficient of determination (R^2)
2015	spring	0.61
	summer	0.5
	autumn	0.38
	winter	0.39
2016	spring	0.37
	summer	0.44
	autumn	0.48
	winter	0.66
2017	spring	0.51
	summer	0.64
	autumn	0.66
	winter	0.68
2018	spring	0.89
	summer	0.65
	autumn	0.64
	winter	0.62

Table S3 Concentration of GEM, $PM_{2.5}$, SO_2 and CO in 2017 and 2018

	GEM (ng/m^3)		$PM_{2.5}$ ($\mu g/m^3$)		SO_2 ($\mu g/m^3$)		CO (mg/m^3)	
	2017	2018	2017	2018	2017	2018	2017	2018
spring	2.59	2.16	43.69	49.92	12.87	10.27	0.73	0.65
summer	2.68	1.72	37.02	29.59	8.33	5.93	0.77	0.52
autumn	2.26	1.92	37.75	34.97	10.70	7.29	0.79	0.68
winter	2.49	1.82	64.28	50.04	14.20	6.58	0.91	0.80
all	2.51	1.91	45.68	41.13	11.52	7.52	0.80	0.66